

Investigating Real-Time-Gaze-Sharing in a Multi-Eye-Tracker-Setup

Thema:

Investigating Real-Time-Gaze-Sharing in a Multi-Eye-Tracker-Setup

Art:

BA

BetreuerIn:

Rebecca Reuter

BearbeiterIn:

Michael Bierschneider

ErstgutachterIn:

Christian Wolff

ZweitgutachterIn:

Niels Henze

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Background

Eye tracker receive an increasing acceptance in research and gaming in the last decades due to an enormous improvement in computer performance and better usability of hard- and software [3]. Although a lot of studies are still conducted with single participants, the interest in experiments with multiple probands and gaze sharing grows, where questions like learning behaviour, problem solving, and collaboration can be investigated [6]. The online game Ibb & Obb [1] was used as a basis to visualise gaze data and thereby explore the gaming experience and feeling of social presence. With the help of the library Spacebrew [7], a WebSocket connection between two computers could be realised to transport data in real-time. Smooth movements were achieved by filtering gaze points before sending them to the visualisation application [4]. For the reliable transmission of gaze data in a network of multiple eye trackers, computers were synchronized with the Network Time Protocol. Results showed that with an increasing number of connected computers and high sample rate of the eye tracker, drastic loss in latency and packet loss occurred [6]. This work aims to investigate the parameters and conditions that facilitate a loss-free real-time transmission of multi-eye-tracker data in the Regensburger Eyetracking-Classroom.

Goals

The focus of this work is the realisation of real-time gaze sharing exemplarily demonstrated with a multiplayer browser game. The starting point is the networking of eye tracks in LAN so that data can be exchanged in real time. The loss of data packages should be strictly avoided. In the context of a feasibility study, gaze data from multiple eye trackers will be recorded and provided for the browser game StarGazer created by Alexander Bazo [2]. With the help of the performance logs resulting from the exemplary application, the best parameters for a stable multi-eye-tracker setup will be evaluated. In detail, it will be examined which network protocols are suitable for real-time transmission. Also, the influence of sample rate and number of eye trackers on the overall performance must be considered. As a result, the asynchrony caused by the high number of network traffic and the associated latency must be investigated. Should a client-server-model be contemplated, the impact of multi-threading must be assessed.

Tasks

- Literature research
- Requirement analysis of the software architecture and exploration of the laboratory environment
- Implementation of client and server applications
- Proof of concept with StarGazer game
- Survey and analysis of performance and reliability of data transmission
- Write thesis

Necessary Knowledge

- Experience with networking and client/server applications
- Programming with JavaScript and/or Python

References

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